

**Findings and Recommendations of
The Tennessee Municipal Solid Waste Advisory Committee
August 20, 2007**

I. The Nature and Scope of the Task

In the last bill that was passed by the Tennessee General Assembly before it adjourned in June 2007, we, the Municipal Solid Waste Advisory Committee, created by T. C. A. 68-211-841, were given two tasks. Section 2(c) of Public Chapter 584¹ states:

There is a moratorium imposed on waste from the bulk survey for release program being disposed in landfills in [Rutherford County] pending the results of the municipal solid waste advisory committee's recommendations which shall be submitted no later than sixty (60) days after July 5, 2007.

Section 1 and the balance of section 2 of P. Ch. 584 give us a broader task of making recommendations regarding, among other things, “finding a higher value use for materials in the waste stream than landfilling” and “[r]educing or eliminating from the landfills food waste, yard waste, radioactive waste, household hazardous waste, chemicals, or other materials which decompose into a liquid or gas or which may increase the environmental hazards potentially created by the landfill or leachate.” Because section 1 of the law sets a deadline of December 31, 2009 for the broad task and section 2(c) sets a sixty day deadline for the recommendations regarding the bulk survey for release program, we understand the legislative directive to be for two different sets of recommendations. This document is the findings and recommendations of our Committee in regard to the Bulk Survey for Release (BSFR) Program as implemented by the Division of Radiological Health (DRH) and the Division of Solid Waste Management (SWM) of the Department of Environment and Conservation (department or TDEC).

II. Process Followed by the Committee

In our meeting on July 5, 2007, which was well attended by the public, in addition to having a presentation by TDEC staff about the nature of the BSFR program, we adopted a schedule for the process we would follow to complete the review of this program and to make our recommendations. That schedule started with two public meetings to receive comment, one in Murfreesboro on the evening of July 17 and one in Nashville on July 24. Written comments from the public were to be received until August 1. We have considered comments that were received after that date, in part because of a newspaper publishing the final date incorrectly as August 3. We also scheduled three additional Committee meetings, August 16, 20, and 28. After hearing the public comment at the July 24 meeting, the Committee discussed what additional information was needed to complete the task. The Committee requested staff invite certain persons and groups to attend the August 16 meeting so that the Committee could gather additional information. These included elected officials in Rutherford County, representatives of BFI / Allied Waste who owns and operates the Middle Point landfill in Rutherford County,

representatives of the companies that process the BSFR material, and representatives of the Murfreesboro Water and Sewer Department. Two other actions on July 24 were that we requested the department staff to provide us with draft recommendations for our consideration and we approved the hiring of a consultant, Lisa Stetar, who is a certified health physicist with experience in radiological risk assessment, environmental monitoring, and regulatory compliance². We were told that the contract was subject to a maximum expenditure limit of \$5,000 because of state contracting procedures.

Throughout this period the department has maintained and updated a page on its web site³ with information about the Committee's review of this program. In addition to having the schedule of meetings, the site has had copies of the presentations and handouts of TDEC staff at the July 5 meeting explaining the BSFR program. The web page also has had links to related web sites, copies of the transcripts of the public meetings on July 17 and July 24, totaling 171 pages, and other information. The site now also has copies of all written materials submitted by the public (302 pages) and the handouts given to the Committee by the speakers on August 16 (78 pages).

At the July 5 meeting, the department stated its view that the task of the Committee boiled down to making a determination of whether the BSFR program is protective of the public health and the environment. We agree this is the ultimate issue we must decide. As with most short summaries of complicated questions there are a number of subsidiary issues: the nature of the waste material, the nature of the landfills that receive the waste, and the pieces of the regulatory system that implement the BSFR program.

Before we proceed to those, however, we would like to address the members of the public who urged us to look at a bigger picture. Because the legislature gave us a short time in which to make these recommendations, it is necessary for us to limit the scope to exactly what the legislature directed. However, as noted above, the same law also gave us a broader task to look at all wastes going to landfills and determine what could be put to beneficial re-use or recycling, and to provide recommendations on those subjects and more. We are excited to have the opportunity to address those broader issues and make recommendations that may be put in place by local governments or that may be enacted into regulation by the Solid Waste Disposal Control Board. We have directed the creation of a task force to address those issues and look forward to seeing their proposals. It is our goal to complete those recommendations well prior to the end of 2009.

II. The Standard for the Findings

As we have said the ultimate issue for this committee is whether the BSFR program is protective of the public health and the environment. To answer that question, we must first say what the standard is for making the decision. One approach has been suggested by a number of commenters that any radioactivity in the Middle Point landfill is unacceptable.⁴ Although the feeling behind this sort of statement is understandable from a lay perspective, it is an impossible standard to meet. Everything emits some level of radioactivity, including our bodies.⁵ If living things did not have radioactive carbon 14 in them, the technique of carbon dating would not work.⁶ Many of the materials that are

typically found in solid waste and are disposed at all municipal solid waste landfills (Class I landfills⁷) have levels of radioactivity that equal or exceed that of BSFR material.⁸ Therefore, the use of the “no radioactivity” standard would do much more than end the BSFR program; it would mean the closure of all landfills. This would cause many serious threats to the public health and environment.

To determine an appropriate standard, we note the statement of values of the Bureau of Environment of TDEC in its mission statement.⁹ It states, “We strive...to solve problems through a scientific and evidence-based approach that respects diverse opinions and provides opportunities for input...”. We agree with this approach. Decisions should be based on the scientific method and credible evidence and processes should be established that allow for information to get to the public and for the public to provide relevant input.

Therefore, we must address three areas, what is the risk posed by the BSFR waste, what degree of scientific uncertainty is there about it, and does the regulatory program impose reasonable measures to protect against the potential harm from the material. We also must address issues related to the public input process.

III. What is BSFR waste?

BSFR waste is defined more by regulatory process than it is by a type of waste. Generally speaking, the generators of BSFR waste are licensed by the U. S. Nuclear Regulatory Commission or a state radiological health program.¹⁰ The waste materials include construction/demolition debris, asphalt, soils, wood, concrete rubble, plastic, paper, and clothing which have extremely low levels of incidental radioactive material.¹¹ It is what remains after the waste materials that are required to go to a licensed low-level radioactive waste disposal facility have been segregated out and disposed.¹²

One point that has not been well understood by the public, and that some commenters minimize, is that the terms low level radiation and low level radioactive waste as used by scientists and government officials cover a very broad range, from near zero to levels that are thousands or tens of thousands times higher than the levels allowed by the BSFR program.¹³ The recent National Academy of Sciences report that both the department and some of the commenters relied upon, the BEIR VII (Biological Effects of Ionizing Radiation) report, defines the term as being “from near zero to 10,000 millirem”.¹⁴ Thus it is critically important for people to understand exactly what radioactivity level is meant when statements are made. The effects of radioactivity at the 10,000 millirem level are not necessarily the same as those at the 1 millirem level, and vice versa.¹⁵ Similarly, a number of commenters have cited BIER VII for its finding that the cancer risk from radiation should be viewed with the linear, no threshold theory.¹⁶ This has been the regulatory approach for many years by DRH and other governmental agencies. BIER VII is the source relied upon by DRH for the cancer risk of a 1 millirem exposure being 1 in a million.¹⁷

The question has been asked why this material is coming to Tennessee from other states. The BSFR program is attractive to facilities in other states where the evaluation of

requests for disposal approval continues to be performed on a case-by-case basis. Reviews of such requests often require long periods of time, and because the evaluation is done on a case by case basis, consistency and timeliness of regulatory decisions vary. Thus although Tennessee's standards for disposal are at least five times more protective than those applied by the NRC, the speed and predictability of the process mean the transaction costs are less.¹⁸

IV. The BSFR regulatory process

The BSFR regulatory process of the Division of Radiological Health is built around the concept of allowing waste to go through the processors and to be disposed of at Class I landfills only when the nature and amount of the waste is such that the most exposed individual will not receive an exposure to more than 1 millirem per year.¹⁹ The millirem is a concept widely used throughout the world by industry and government that considers both the nature and amount of the radiation dose and the biological effect.²⁰ Exposure to radioactivity is modeled using RESRAD, a widely accepted computer program to determine the amount of waste and the radioactivity level that can be accepted at the landfill to meet the 1 millirem limit.²¹ The model allows the user to input over 100 different values for items including the existence of a cover over the landfill, and the nature of the soil under the landfill. As used by DRH, certain of those parameters are set in a conservative manner. For instance, no credit is taken for a cover over the landfill when it is completed (although the SWM management regulations require it) and no credit is taken for the synthetic liner.²² The DRH also limits the total amount of BSFR waste that can be accepted at the landfills authorized to receive it. No more than 5% of the waste disposed may be BSFR waste. For example, from 1999 to 2007, BSFR waste was 0.13% of the total waste received at Middle Point. From 2004 to 2006, BSFR waste was 0.2% of the total waste received at Middle Point.

In judging the appropriateness of the 1 millirem maximum dose limit, it is useful to compare with other regulatory limits and the amounts of radiation dose received from other activities.²³

The following are allowable doses for various classes of radiation workers and members of the public. These standards have been set by the Nuclear Regulatory Commission and are applied by all Agreement States. They are considered to be fully protective of human health.

- individual members of the public - 100 millirems per year
- embryo/fetus during the entire pregnancy, due to occupational exposure of a declared pregnant woman - 500 millirems
- occupational dose limit for minors - 500 millirems per year
- occupational dose to adults - 5,000 millirems per year

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The following are radiation doses typically received from certain sources:

Chest x-ray – 10 mrem

Mammogram – 30 mrem

Cross-country airline flight – 5 mrem

Cosmic rays – 31 annually
Human body – 39 annually

The total average annual exposure people in the United States receive is 360 millirem, of which 300 is from natural sources.

We find that both the use of the model and the 1 millirem limit are protective of the public health and environment. Because many commenters, including local officials, have emphasized the scientific uncertainty, we specifically find that there is a high level of consensus among the scientists on these issues and the program is consistent with that consensus.²⁴

There is also regulatory oversight of the firms that are licensed by DRH to process this material. The BSFR material is only one component of the radiation sources that these firms are licensed by DRH to handle. DRH has an inspection program of its licensees. The five locations of the four firms handling BSFR material have been inspected 26 times since 2001, although not all of those inspections included the BSFR processes. Seventy-one total violations were found in those inspections. Four violations were found in the BSFR processes which were corrected promptly by the companies.²⁵ We find that this approach is protective of public health and environment and that these firms are not self-regulating as has been alleged.

However, we do find that the five recommendations of Lisa Stetar²⁶ should be implemented by DRH. These are the types of measures that could be termed “incremental improvement.” They do not mean that the existing program was inadequate, but they should result in some improvement.

VI. Landfill issues

The Committee’s role is not to perform a complete review of everything to do with the Middle Point landfill, but rather to take a look at it in the context of the disposal of BSFR waste there. BSFR waste goes to five Tennessee landfills, i.e., North and South Shelby County, Chestnut Ridge, and Carter Valley as well as Middle Point as a “special waste”. However, because of the concern about Middle Point that was a factor in the enactment of P. Ch. 584 and the concern expressed by the public in the process we have followed, we have considered the issues raised concerning the Middle Point landfill. Our charge is to determine whether the disposal of BSFR waste at Tennessee landfills is or is not protective, using Middle Point as one example.

East Fork Stones River / water supply. The landfill is .6 - .9 miles²⁷ downstream of the main intake point for Murfreesboro’s water system, not upstream. This is the intake that was in use when the landfill was first permitted. There is an auxiliary intake, installed about five years ago that is approximately 7 miles downstream of the landfill, in Percy Priest Lake. The landfill was originally permitted in 1988 and has been operated since the 1990s by BFI which was acquired by Allied Waste. The city has been monitoring the water annually near the Walter Hill dam about 1.3 miles downstream from the landfill for

radionuclides for about 15 years and has never detected any contaminants at levels that would indicate a need for additional treatment. All of the analyses of the river water showed radionuclides were below the detectable limit of the method used, except for two occasions. On one, in 1988, the gross alpha radiation was detected but was below drinking water standards. On the other, in 1993, the untreated river water did exceed drinking water standards for gross beta radiation.²⁸ 1988 was before the BSFR program started and in 1993 only one of the four processors was licensed to handle BSFR material.²⁹ On no occasion has the treated drinking water of the city exceeded standards for radionuclides.³⁰ (By using drinking water standards for a point of comparison, neither the city nor this Committee is implying that the standards are intended by EPA or TDEC to apply to river water; they apply to drinking water after it is treated.)

Liner. When the Middle Point landfill was originally permitted in late 1988, clay liners were required. The regulations were changed in 1993 to require that new cells at Class I landfills have a composite liner system, consisting of at least a 5 foot thick clay buffer, overlain by a 2 foot re-compacted clay liner of lower permeability, and a welded (and tested) flexible synthetic membrane liner (usually 60mil High Density Polyethylene). Above the composite liner is another level of high permeability material such as gravel in which a system of pipes is laid to collect leachate.³¹ The Middle Point landfill collects the leachate, treats it and then it is piped into the city sewer for further treatment at the waste water treatment plant. The liner system beneath Section 1 is a re-compacted clay liner over the clay geologic buffer. Neither the synthetic liner nor the clay liner is adversely impacted by radioactivity³²

During the installation of the landfill gas extraction system at the Middle Point landfill, eighteen holes were accidentally drilled through the HDPE component of the bottom liner by the contractor employed by the landfill. To correct this, with Division of Solid Waste Management oversight and approval, BFI overdrilled each of the locations, keeping the borehole open with a temporary steel casing, examined the damaged areas with downhole video cameras, and repaired punctures with a low-permeability mixture of neat cement and bentonite grout. The grout plugs extend from the bottom of the borehole in the compacted clay liner, through the synthetic liner and up into the waste a minimum distance of ten feet, re-establishing the integrity of the liner system.³³ The Department also took formal enforcement action against the landfill operator, including assessing civil penalties for these events.

Some commenters stated that the liner would only last for 50 years or less. There is no technical publication which supports this assertion. SWM regulations mirror EPA regulations concerning this standard. HDPE landfill liner longevity data as is available, including data from both EPA technical publications and manufacturer's Material Safety and product data sheets indicates that the viable lifespan of HDPE landfill liner material is measured in terms of centuries, and not in decades. There are credible estimates in this record ranging from 200 to 500 years.³⁴

C. Ground water monitoring: On November 4, 2005, the Division of Solid Waste Management made the determination that the Groundwater Monitoring program was

sufficient to provide adequate monitoring of groundwater quality beneath the Middle Point landfill. The down-gradient monitoring wells are placed in soils over and in bedrock fractures. These wells communicate with deep groundwater in the fractures, and with shallow water in the soils over the bedrock.³⁵

Recently, DRH staff took samples of leachate from the leachate collection systems at landfills that accept BSFR material and from ones that do not. The purpose of this was to determine whether there is radioactivity in leachate from landfills that do not accept BSFR waste. Since it was a limited set of data, its use should be limited. However, the data documents that there is radioactivity at some low levels in all the landfills tested. This is not surprising, given the fact that many different wastes, and sometimes the soil used for landfill cover have radioactivity at levels equal to or exceeding the extremely low levels of the BSFR program.

There are risks to the human health and the environment from the waste our society produces. This is why we no longer have garbage “dumps,” instead the regulations require engineered landfills. We have described many, but not all of the components of those regulations above. Today’s landfills, constructed according to the regulatory standards are the standard, accepted technology for minimizing these risks, nationally. Landfills are a human activity and some mistakes will occur, as have been mentioned above. We note that the oversight by SWM of Middle Point has included 139 inspections and three formal enforcement Orders assessing significant civil penalties.

For all of the foregoing reasons, we find that the manner in which BSFR waste is disposed as a special waste in Tennessee landfills, including the Middle Point landfill, and the manner in which that is regulated by SWM is protective of the public health and environment.

VII. Issues Regarding Public Input

Although we have found that the substantive requirements of DRH and SWM and their systems to implement them through regulations, permit / license requirements are protective, we feel we must also address the public information and public input concerns as well. We do encourage TDEC to make changes in its processes applicable to BSFR to make them more transparent to the public. We believe that this is the primary thing TDEC can do to address the anger and mistrust that the public has expressed during this process. We recommend TDEC take action to improve the information in public notices, to consider adding public notice into processes not currently including it, to put more information on the web site, including information about special wastes accepted at landfills, to make available to the public on an annual basis information regarding the volumes of BSFR waste going to Tennessee landfills, and to have a single person designated to respond to issues raised by the public for both divisions. We understand that many of these items may entail an increase in staff time which could be a resource issue and could be an issue of making certain actions less timely. We also recognize that the NRC does not have the same sorts of procedures for public participation in their regulations that EPA does in its programs, which has certain legal consequences. We do

not know the best way to balance the goal of providing opportunities for informed input to the public with TDEC's resources and possible legal constraints. Therefore we charge TDEC with implementing this recommendation. TDEC can and should implement these changes through operating procedures and regulations and we do not see the need for legislative action. However, we expect TDEC to report back to this Committee by January 31, 2008 to describe how this recommendation has been implemented.

VIII. Conclusion

For all of the reasons stated above, we find that the BSFR program as implemented by the Division of Radiological Health and the Division of Solid Waste Management of the Department of Environment and Conservation is protective of the public health and environment although we do recommend implementation of the identified improvements of the BSFR program. We strongly recommend that improvements be made in the public notification and input processes of the two Divisions. We also would encourage the Nuclear Regulatory Commission make changes in its process to make it more efficient and less time consuming. In closing we note that neither the moratorium put in place by the General Assembly nor any potential ban on BSFR waste going into landfills has the effect of preventing all radioactive waste from going into landfills. As was stated above, there are many other waste streams that have as much or more radioactivity. Nor does it appear possible to ban all radioactive waste from landfills, because at some level everything is radioactive and many items in "normal garbage" have as much radioactivity as BSFR material.

Mayor J.H. Graham
Chairman Pro Temp for
The Municipal Solid Waste Advisory Committee

Endnotes

¹ Appendix 1 is a copy of P. Ch. 584 of the Acts of 2007.

² Appendix 2 is a copy of the C.V. of Elizabeth Stetar.

³ <http://www.state.tn.us/environment/rad/bsfr/>

⁴ See e.g., comment of Kathleen Ferris, Transcript of July 24 Public Meeting (hereinafter, “July 24 Transcript”) p. 14; comment of Mary Miller, Compilation of written public comments (hereinafter, “Written comments”), p. 2; comment of Terri Hogan, Written comments, p.3; comment of Andrea Hale, Written comments, p.23; comment of Tommy Nokes, Written comments, p.31; Comment of Paul Long, Written comments, p.57; Comment of Sandra Garrett, Written comments, p.59; Comment of Patricia Sanders Written comments, p.68-70.

We also note that strongly held opinion stated in conclusory terms, with no objective basis has been held by courts in other jurisdictions to be an inadequate basis for administrative action. See *Adelman Real Estate Co. v. Gabanic*, 109 Ohio App.3d 689, 672 N.E.2d 1087, Ohio App. 11 Dist.,1996; *Board of County Comm’rs v. Teton County Youth Servs, Inc.*, 652 P. 2d. 400, 411 (Wyo. 1982).

⁵ See comment of Michael Mobley, Transcript of July 17 Public Meeting (hereinafter, “July 17 Transcript”), p.47-51

⁶ Comment of Impact Services, Written comments p. 162.

⁷ See Rule 1200-1-7-.01(3) for the different classes of landfills in Tennessee.

⁸ See discussion of the BSFR waste stream below.

⁹ Appendix 3 is a copy of the entire document.

¹⁰ Responses to Comments from the Public on Bulk Survey for Release Program and Disposal in Class I Landfills by TDEC (hereinafter, “Responses”), item I. A-D.

¹¹ Id; Toxco, Written comments, p. 83; Studsvik, Written comments, p.113.

¹² Id; Energy, Technology and Environmental Business Association comment, Written comments, p.52; Lisa Stetar report, Handouts given to Committee August 16 (hereinafter, “August 16 Handouts”), p. 76.

¹³ Statement of Daniel Hirsch, Written comments, p.80.

¹⁴ Responses, item I. S;

¹⁵ Id, citing p. 63 of BIER VII.

¹⁶ Frances Lambert, Written comments, p.61; ENDIT, Written comments, p.75.

¹⁷ Responses, item I. S;.

¹⁸ Responses, item I. FF-HH; Studsvik Written Comments, p.116.

¹⁹ Responses, item I. E-K and comments from processors.

²⁰ Responses, item I. O; Toxco, Written comments, p.84.

²¹ Responses, item I. E-K; Mark McHugh document, August 16 Handouts, pp. 3-7.

²² Lisa Stetar report, August 16 Handouts, p. 72

²³ Responses Item I. Q; Lisa Stetar report, August 16 Handouts, p. 75.

²⁴ This addresses the concern expressed in the resolution of the Murfreesboro City Council that any such finding be based on clear scientific evidence, Written Comments p.299.

²⁵ Responses, item I. E-K, p.7.

²⁶ Lisa Stetar report, August 16 Handouts, p. 64-66.

²⁷ The range appears to be due to the fact that the landfill occupies some distance along the river. Responses, Item I. AA-DD; Memorandum from Joe Kirchner, Director of Murfreesboro Water and Sewer Department (hereinafter, “Kirchner Memo”), August 16 Handouts, p. 49.

²⁸ Kirchner Memo, August 16 Handouts p. 50.

²⁹ Responses, item I. E-K.

³⁰ Kirchner Memo, August 16 Handouts p.50.

³¹ Responses, Item II.S; Powerpoint slides of Dr. Robert Bachus, August 16 Handouts pp. 40-45.

³² Powerpoint slides of Dr. Robert Bachus, August 16 Handouts p.46.

³³ Responses, Item II.T.

³⁴ Responses, Item II. U; Impact Written comments, p. 169; Powerpoint slides of Dr. Robert Bachus, August 16 Handouts, p.46.

³⁵ Responses, Item II.LL.

PUBLIC CHAPTER NO. 584**SENATE BILL NO. 1779**

By Jackson, Harper, Marrero, Raymond Finney, Tracy

Substituted for: House Bill No. 1345

By Shepard, Gilmore, Pruitt, Rowland

AN ACT to amend Tennessee Code Annotated, Title 68, Chapter 211, relative to solid waste disposal planning.

WHEREAS, the general assembly funded a joint solid waste study by Tennessee State University and Middle Tennessee State University to determine how to divert solid waste from landfills by finding a higher value use for solid waste as raw materials in business or compost and to protect the environment; and

WHEREAS, the report from the study has been released; and

WHEREAS, the general assembly created the Tennessee Municipal Solid Waste Advisory Committee pursuant to Tennessee Code Annotated, Section 68-211-841 comprised of 15 members representing a variety of, governmental, business, and environmental interests as well as the public to advise the Commissioner of the Department of Environment and Conservation regarding solid waste management; and

WHEREAS, Tennessee can generate businesses and jobs if solid waste is used as a raw material in business; and

WHEREAS, there are safe, practical methods to divert materials from landfills to protect the waters and people of the State of Tennessee; and

WHEREAS, some landfills require remedial attention because of degraded environment; and

WHEREAS, solid waste and landfills can create issues of environmental injustice; now, therefore,

BE IT ENACTED BY THE GENERAL ASSEMBLY OF THE STATE OF TENNESSEE:

SECTION 1. The municipal solid waste advisory committee is directed to develop by December 31, 2009, recommendations using input from Tennessee State University and other stakeholders in regard to as many of the following as is possible:

(1) Finding a higher value use for materials in the waste stream than landfilling; and

(2) Reducing or eliminating from the landfills food waste, yard waste, radioactive waste, household hazardous waste, chemicals, or other materials

which decompose into a liquid or gas or which may increase the environmental hazards potentially created by the landfill or leachate.

Using funds available in the solid waste management fund, the department may make a grant to Tennessee State University for this work.

SECTION 2. (a) The recommendations shall:

(1) Determine how Class IV construction and demolition waste can be ground, mulched, crushed, or disposed of on the construction site;

(2) Determine the nature, amount, and source of hazardous waste in the solid waste stream and the construction and demolition waste stream;

(3) Illustrate how to use the materials in the waste stream for business, as compost, or in other ways;

(4) Identify states which have clear and concise regulations implementing such practices;

(5) Determine the components of the municipal waste stream and the construction and demolition waste stream in Tennessee including sources of hazardous waste and materials which can be composted, reused, recycled or otherwise diverted from the landfills; and


(6) Determine methods by which waste can be diverted from landfills using transfer stations, drop-off points, composting facilities or other means.

(b) The recommendations of the advisory committee shall be made available to the public, municipalities, counties, and businesses in the state so that they may be implemented and shall also be considered by the solid waste disposal control board for incorporation into rules.

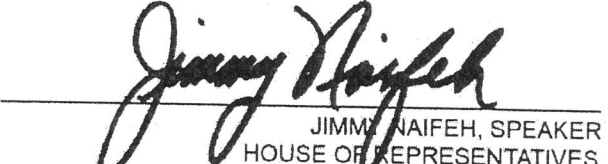
(c) There is a moratorium imposed on waste from the bulk survey for release program being disposed in landfills in any county having a population of not less than one hundred eighty-two thousand (182,000) nor more than one hundred eighty-two thousand one hundred (182,100) according to the 2000 federal census or any subsequent federal census pending the results of the municipal solid waste advisory committee's recommendations which shall be submitted no later than sixty (60) days after July 5, 2007.

SECTION 3. This act shall take effect upon becoming a law, the public welfare requiring it.

PASSED: June 12, 2007




RON RAMSEY
SPEAKER OF THE SENATE



JIMMY NAIFEH, SPEAKER
HOUSE OF REPRESENTATIVES

APPROVED this 28th day of June 2007



PHIL BREDESEN, GOVERNOR

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Education

1992 Master of Science, Health Physics
Department of Energy Operational Health Physics Fellowship
Colorado State University

1983 Bachelor of Science in Biology
Middle Tennessee State University

Certification

American Board of Health Physics Comprehensive Certification 1992

Professional Experience

1990 to Present

Since 1990, I have worked as a radiation protection consultant specializing in radiological risk assessment, environmental monitoring, and regulatory compliance. The specific projects in which I have participated are listed below.

Risk Assessment Corporation (RAC) (February 2003 to Present). Serve as member of the RAC team the RACER Project (Risk Analysis Communication Evaluation and Reduction) at the Los Alamos National Laboratory and the Tribal Risk Assessment Project at the San Ildefonso Pueblo in Northern New Mexico.

City of Oak Ridge, Tennessee (1992 to Present). Technical and regulatory compliance consulting on issues involving radioactive materials. Work to date has included development of dose-based, radionuclide limits for land application of municipal wastewater treatment plant sludge and development of discharge criteria for releases of radioactive materials to the Oak Ridge sewer system.

AAR Manufacturing Inc., Livonia, Michigan (August 2002 to January 2007). Performed radiological risk assessments to evaluate potential risks from residual thorium contamination at the AAR site which was formerly used for the manufacture of products containing thorium alloys. Developed soil cleanup criteria and obtained approval from the Nuclear Regulatory Commission approval for release of the site from regulatory control.

Department of Energy, Oak Ridge Reservation (April 2001 to 2006). Provided technical assistance on issues related to the presence of residual radioactive materials in solid wastes including development of screening criteria for volumetric contamination in wastes disposed of in sanitary and construction/demolition landfills at the Y-12 National Security Complex.

CH2MHill Mound (September 2003 to 2005). Provided technical consulting on issues related to the closure of the DOE Mound Site in Miamisburg, Ohio including dose assessments and evaluation of potential impacts associated with the proposed connection of the Mound wastewater treatment system to the City of Miamisburg's sewer system.

Association of Metropolitan Sewerage Agencies (March 1999 to 2004). Developed a dose assessment methodology to calculate doses to workers and members of the public from naturally occurring and man-made radionuclides present in wastewater treatment plant systems and biosolids. Served as a technical liaison to the ISCORS subcommittee on sewage sludge.

Alliant Corporation (January 2001 to December 2003). Performed radiological dose assessments in support of the preparation of Environmental Assessments under the National Environmental Policy Act for the Department of Energy Oak Ridge Reservation and the U.S. Energy Corporation Centrifuge Facility in Portsmouth, Ohio.

Tennessee Department of Environment and Conservation (March 1998 to 2000). Provided technical review of Department of Energy proposals related to activities on the Oak Ridge Reservation including decontamination and decommissioning, free release of contaminated materials, and re-industrialization of the K-25 Site. Participated in the NRC/State Pilot Program for External Regulation of the Department of Energy. Reviewed radioactive material license applications for major radioactive and mixed-waste processing facilities.

City of Santa Fe, New Mexico (1999 to 2000). Served as a technical consultant and expert witness on a case related to the City's efforts to control discharges of radioactive materials to the public wastewater treatment system.

Radiological Assessments Corporation (1992 to 1997). Provided consulting services related to the reconstruction of historical, radiation and chemical doses to the public from environmental releases from Department of Energy Nuclear Weapons Sites. Specific projects included the Savannah River Site Dose Reconstruction Phase I and II and the Rocky Flats Plant Dose Reconstruction Phase II

M4 Environmental Management, Inc., Oak Ridge, Tennessee (1994 to 1996). Developed procedures for monitoring of effluents from M4 Technology Center which utilized Quantum Catalytic Processing (Q-CEPTM) for treatment of mixed wastes. Also provided technical and regulatory compliance input on M4's radioactive materials license application

Battelle Pacific Northwest Laboratories (1994). Provided technical assistance and peer review on a study, contracted by the Nuclear Regulatory Commission, to determine the extent to which radioactive materials are reconcentrated by municipal wastewater treatment plants (NUREG/CR-6289, 1994).

Environmental Technology, Inc., Kearsarge Metallurgical Facility Superfund Cleanup (1992). Designed and implemented a radiation protection program and provided radiation protection training for workers involved in cleanup of the Kearsarge Superfund Site Cleanup which was contaminated with naturally occurring radioactive materials (NORM). Also, provided technical and regulatory compliance assistance on issues related to the handling and disposal of the Kearsarge NORM wastes.

Additional Experience

Health Physics Fellowship Practicum, Research at the Oak Ridge National Laboratory (January 1990 to August 1990). Designed and conducted a radiotracer study to determine removal efficiencies for certain radionuclides in municipal wastewater treatment systems.

Tennessee Division of Radiological Health, Licensing Section (February 1988 to December 1989). Reviewed and evaluated license applications, and performed compliance inspections for complex radioactive materials facilities including two of the nation's largest processors of low-level radioactive waste.

Tennessee Division of Radiological Health, Environmental Monitoring Section Supervisor (February 1984 to February 1988). Managed a statewide environmental monitoring program for radionuclides, developed environmental monitoring procedures and quality assurance plans, and evaluated effluent releases from state-licensed facilities to ensure compliance with state regulations through site-specific monitoring and inspections.

Publications

- I.L. Larsen, E.A. Stetar, B.G. Giles, and B. Garrison. "Concentrations of Iodine-131 Released from a Hospital into a Municipal Sewer." *Radiation Protection Management*. May/June 2000.
- I.L. Larsen, E.A. Stetar, and K.D. Glass. "In-House Screening for Radioactive Sludge at a Municipal Wastewater Treatment Plant." *Radiation Protection Mgt.*, 12, 29-38 (1995).
- C.C. Ainsworth, R.L. Hill, K.J. Cantrell, D.I. Kaplan, M.V. Norton, R.L. Aaberg, E.A. Stetar. Reconcentration of Radioactive Material Released to Sanitary Sewers in Accordance with 10 CFR Part 20. NUREG/CR-6289. Prepared by the Pacific Northwest Laboratory for the U.S. Nuclear Regulatory Commission. 1994.
- E.A. Stetar, H. L. Boston, I.L. Larsen, and M. H. Mobley. "The Removal of Radioactive Cobalt, Cesium, and Iodine in a Conventional Municipal Wastewater Treatment Plant." *Water Environ. Res.*, 65, 630-639 (1993).
- I.L. Larsen, S.Y. Lee, H.L. Boston, and E.A. Stetar. "Discovery of a Cesium-137 Radioactive Particle in Municipal Wastewater Treatment Sludge," *Health Physics*, March 1992.

Tennessee Department of Environment and Conservation
Bureau of Environment
Statement of Purpose

Governor Bredesen's Areas of Environmental Emphasis

Protecting and Improving our Land, Air and Water;
Preserving Open Spaces and Enhancing Local Communities;
Forging Public-Private Partnerships to Promote Natural Resource Stewardship

Bureau of Environment's Mission

To safeguard human health and the environment for all Tennesseans by protecting and improving the quality of our land, air and water for present and future generations

Bureau of Environment's Vision

To make Tennessee a national model of environmental stewardship

Bureau of Environment's Values

We strive to serve the public in a timely, fair and consistent manner;
to solve problems through a scientific and evidence-based approach that respects diverse opinions and provides opportunities for input; and
to support our people by creating a workplace where employees can achieve their greatest potential.

January 2006